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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,375	09/28/2001	Jong-Seo Choi	P56533	2237

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EXAMINER

QUARTERMAN, KEVIN J

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 12/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/964,375

Applicant(s)

CHOI ET AL.

Examiner

Kevin Quarterman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7,10,12,20,29,48-53,55,57-70,72-74 and 76 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7,10,12,20,29 and 48-50 is/are allowed.
- 6) ☒ Claim(s) 51,52,55,57-61,63,64,66-69,72,73 and 76 is/are rejected.
- 7) ☒ Claim(s) 53,62,65,70 and 74 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment and remarks received 26 September 2006 have been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 51, 57-58, 60, 63, 68, and 72 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakanishi (JP 53-091562 A).
4. Regarding independent claim 51, Figure 2 of Nakanishi shows a cathode comprising a metal base (2); a layer (5) of electron-emitting material disposed upon the base; and a needle-shaped electrically conductive material (4) providing electrically conductive paths disposed throughout the layer of electron-emitting material, the needle-shaped electrically conductive material having a specific resistance not greater than 10^{-1} ohms-centimeter (Abstract).
5. Regarding independent claim 57, Figure 2 of Nakanishi shows a cathode comprising a metal base (2) and a layer (5) disposed upon the metal base, the layer comprising an electron-emitting material, and a needle-shaped electrically conductive material (4) disposed within the layer and having a specific resistance less than a specific resistance of the electron-emitting material (Abstract).

6. Regarding claim 58, Figure 2 of Nakanishi shows the needle-shaped electrically conductive material (4) providing electrically conductive paths in the layer.
7. Regarding claim 60, Nakanishi discloses a conductive material (carbon) having a specific resistance not greater than 10^{-1} ohms centimeter (Abstract).
8. Regarding independent claim 63, Figure 2 of Nakanishi shows a cathode comprising a metal base (2) and a layer (5) disposed upon the base, the layer comprising an electron-emitting material, and a needle-shaped electrically conductive material (carbon) having a specific resistance not greater than 10^{-1} ohms centimeter (Abstract).
9. Regarding independent claim 68, Figure 2 of Nakanishi shows a cathode comprising a metal base (2); a layer (5) of electron-emitting material including an electron-emitting barium-based alkali-earth metal carbonate material disposed upon the base; and a needle-shaped electrically conductive material (4) providing electrically conductive paths in the layer of electron-emitting material, the conductive material (carbon) having a specific resistance of not greater than 10^{-1} ohms centimeter (Abstract).
10. Regarding independent claim 72, Figure 2 of Nakanishi shows a cathode comprising a metal base (2) and a layer (5) formed on the base from a carbonate paste comprising a carbonate paste containing a barium-based carbonate electron-emitter and a needle-shaped electrically conductive powder (4), the needle-shaped electrically conductive powder (carbon) having a specific resistance not greater than 10^{-1} ohms centimeter (Abstract).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 52, 61, 64, 67, 69, and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakanishi (JP 53-091562 A) in view of Saito (US 6,124,666).

14. Regarding claims 52, 64, 69, and 73, Nakanishi teaches the limitations of independent claims 51, 63, 68, and 72, as discussed above, but fails to exemplify a metal layer exhibiting a grain size smaller than the metal base and interposed between the metal base and the layer of electron-emitting material.

15. Saito teaches that it is known in the art to provide a cathode structure including a metal layer exhibiting a grain size smaller than the metal base and interposed between

the metal base and the layer of electron-emitting material for improving the life characteristics of the device (Abstract).

16. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode of Nakanishi with the metal layer taught by Saito for improving the life characteristics of the cathode.

17. Regarding claim 61, Saito discloses the layer having a thickness in a range of 30 microns to 80 microns (col. 1, ln. 34-35).

18. Regarding claim 67, Saito discloses the layer of electron-emitting material having a thickness in a range of 30 microns to 80 microns (col. 1, ln. 34-35).

19. Claims 55, 59, 66, and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakanishi (JP 53-091562 A) in view of Saito (US 6,376,976).

20. Regarding claims 55, 59, 66, and 76, Nakanishi teaches the limitations of independent claims 51, 57, and 63, as discussed earlier, but also fails to exemplify the layer of electron-emitting material having a surface roughness being less than 10 microns.

21. Saito teaches that it is known in the art to provide a cathode structure with a layer of electron-emitting material having a surface roughness less than 10 microns for improving the resolution of the display (col. 7, ln. 37-40).

22. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode of Nakanishi with a layer of electron-emitting material having a surface roughness less than 10 microns, as taught by Saito, for improving the resolution of the display.

Allowable Subject Matter

23. Claims 7, 10, 12, 20, 29, and 48-50 are allowed.
24. Claims 53, 62, 65, 70, and 74 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
25. The following is a statement of reasons for the indication of allowable subject matter: Regarding independent claim 7, the prior art of record neither shows or suggests a cathode for an electron tube comprising, in addition to other limitations of the claim, a needle-shaped conductive material being a carbonaceous material, the needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of the electron-emitting material, and a thickness of the electron-emitting material layer being in a range of 30 to 80 μ m.
26. Regarding independent claim 10, the prior art of record neither shows or suggests a cathode comprising, in addition to other limitations of the claim, an electron-emitting material layer comprising a needle-shaped conductive material and having a surface roughness less than 10 microns, wherein the needle-shaped conductive material in the electron-emitting material layer is in the range of 0.01 to 30% by weight based on a total weight based of the electron-emitting material.
27. Regarding independent claim 12, the prior art of record neither shows or suggests a cathode for an electron tube comprising, in addition to other limitations of the claim, an electron-emitting material layer comprising a needle-shaped conductive

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material, the needle-shaped conductive material being at least one selected from a group consisting of nickel, rhenium, molybdenum, and platinum.

28. Regarding independent claim 20, the prior art of record neither shows or suggests a cathode for an electron tube comprising, in addition to other limitations of the claim, an electron-emitting material layer having a surface roughness less than 10 microns and a metal layer including nickel grains and further including at least one metal selected from a group consisting of aluminum, tantalum, chromium, magnesium, silicon, and zirconium.

29. Regarding independent claim 29, the prior art of record neither shows or suggests an oxide cathode for an electron tube comprising, in addition to other limitations of the claim, an electron-emitting material layer comprising a needle-shaped conductive material being at least one material selected from a group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum, the needle-shaped conductive material being a carbonaceous material, the needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of the electron-emitting material layer, and a thickness of the electron-emitting material layer being in a range of 30 to 80 μ m.

30. Regarding independent claim 48, the prior art of record neither shows or suggests a cathode comprising, in addition to other limitations of the claim, additional means for providing electrically conducting paths through a layer means for emitting electrons, the additional means comprising a needle-shaped electrically conductive material having a specific resistance not greater than 10^{-1} ohms centimeter and

comprising 0.01% by weight to 30% by weight of the layer means. Due to their dependency upon independent claim 48, claims 49-50 are also allowable.

31. Regarding claims 53, 62, 65, 70, and 74, the prior art of record neither shows or suggests a cathode comprising, in addition to other limitations of the claim, a needle-shaped conductive material comprising 0.01% by weight to 30% by weight of a layer of electron-emitting material.

Response to Arguments

32. In response to applicant's argument that Nakanishi does not disclose a needle-shaped electrically conductive material having a specific resistance not greater than 10^{-1} ohms-centimeter, the Examiner notes that when the claimed and prior art products are identical in structure or composition, a prima facie case of anticipation has been established (MPEP § 2112.01). Nakanishi discloses the needle-shaped electrically conductive material being carbon needles. Applicant discloses in the instant application carbon as a possible material for the needle-shaped electrically conductive material having a specific resistance not higher than 10^{-1} ohms-centimeter. Thus, the Examiner holds that Nakanishi teaches the claimed invention as discussed earlier.

Conclusion

33. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

34. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

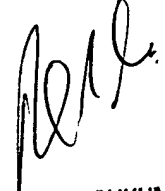
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quarterman whose telephone number is (571) 272-2461. The examiner can normally be reached on M-TH (7-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin Quarterman
Examiner
Art Unit 2879

kq 
7 December 2006


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